Available online at www.sciencedirect.com

ScienceDirect

Procedia - Social and Behavioral Sciences 93 (2013) 2063 – 2067

Procedia
Social and Behavioral Sciences

3rd World Conference on Learning, Teaching and Educational Leadership – WCLTA 2012

Differentiation and Individualization in the Organization of the Teaching-Learning Activities in Mathematics

PhD. Daniela Căprioară, PhD. Virgil Frunză[a]

Faculty of Psychology and Educational Sciences, Ovidius University of Constanţa, România

Abstract

It is obvious that in the last decades important efforts have been made to orientate the teaching-learning activities towards differentiation and individualization. Also, empiric researches have been carried out to prove the advantages of a differentiated and individualized education compared to the traditional education, which, in most of the cases, still remains a collective or frontal type of education. Approaches have been made for training the teachers who would possess the necessary skills for the good organization of the differentiated and individualized teaching, and great efforts have also been made for the learning institutions' modernization and endowment, so that they would meet the demands required by the differentiated and individualized teaching. Despite all these advantages and positive followings attached to the differentiated and individualized teaching, we should not bet on a single card and consider that the efficiency of the whole instructive-educative process can be obtained only by the obsessive promotion of the debated modalities. Being aware of the risks of such one-dimensional approach, we will try to show in this paper how good results in mathematics learning can be obtained, if this subject benefits from a correct differentiation and individualization.

Selection and peer review under responsibility of Prof. Dr. Ferhan Odabaşı

Keywords: Differenciation, individualization, didactic strategies;

Introduction

The arguments for differentiated and individualized instruction in mathematics are multiple, but all are reduced to a basic idea: the students are different among them from the „accommodation structures" point of view (Bachelard, 1938), both in terms of operational and cognitive structures. Thus, in terms of mathematics the students have different instruction needs, different reporting capabilities to the act of instruction and they outline their own instruction purposes.

[a] Corresponding Author: Daniela Căprioară. Phone no.: +40 727 057981

E-mail address: ccaprioara@yahoo.fr

Virgil Frunză. Phone no.: +40 727 057981

Selection and peer review under responsibility of Prof. Dr. Ferhan Odabaşı

doi:10.1016/j.sbspro.2013.10.166

Concerning the differentiation, ”differentiated pedagogy followers know that each student learns in a different way, by different approaches and that at the same time each has specific skills and difficulties. In order to regulate and optimize the learning activity, they estimate that it is indispensable to try to know individual difficulties, in order to differentiate the pedagogic treatment, depending on the characteristics of each” (Raynal and Rieunier, 1997, p. 271). Also, ”differentiated pedagogy legitimates the collective character of the school, it allows schooling of all students, avoiding the ‘standard’ treatment (Perrenoud, 1998) because piloting of instruction is individual. Without differentiation, the school is automatically elitist and selective and event new pedagogies create distances. Moreover, the absence of differentiation in learning determines differentiated school paths, it encourages schools to specialize undemocratically, involving students’ social segregation” (Minder, 2011, p. 301).

Referring to individualized activity Mialaret (1991) identifies the following advantages:

a) it facilitates the observance of working rhythms of the students which means that each one forwards into the tasks in the rhythm characterizing him: *”Individualized activities techniques allow everyone to follow his own path with his personal speed; those who go faster will have to perform complementary activities, too: more difficult exercises, additional reading opportunities, eventually help offered to the mates in difficulty”.*

b) it allows fast identification of errors made by students and also offering of exercises leading to their elimination and also the improvement of understanding processes of knowledge which students should acquire and in the situation of contemporary school this approach is facilitated by the use of computer, as it has real virtues in teaching streamlining;

c) it can better motivate students because in certain learning circumstances they can choose towards themes or tasks which are more calibrated on the opportunities they have and also which are consonant with the expectations students have in connection with this type of activity;

d) if better performing students work independently, the teacher can offer more assistance and more accentuated support to students experiencing difficulties or with special needs. In other words, in the situation of individualization it also becomes flexible the process of guiding the students so that some students beneficiate from a minimum guiding, other from a moderate one and finally those having problems can beneficiate from a maximum guiding.

To these advantages can be added that the individualization of the educational offer determines an active learning that, in its turn, it generates facilities in the correct significance of knowledge, in their long term better memorization, by their easier implementation (in solving problems or developing various activities).

Besides advantages, Mialaret (1991) identifies the following inconveniences:

-the difficulty of individualization and differentiation in very crowded classrooms where, many times, also lack learning means to support and facilitate necessary steps in this approach;

-the individualized activity poorly understood and poorly organized may, as Mialaret says, ”hide a non-activity and it may determine more catastrophic results than the ones obtained in frontal education (collective): finding of easy solutions, interest diverted to areas that do not have sufficient educational load, too indulgent self-evaluation, etc.

-if they abuse the use of individualized instruction - learning activities there is a risk to lose benefits and benefic consequences of group learning due to social facilitation aspects.

There are more levels of individualization and differentiation of the instruction activity, the most important being the ones aiming *the contents of the process of learning (or of instruction) and the didactic strategies (instruction methods and learning means, the ways of organization of the instruction and learning activity.)* we haven’t indicated the educational objectives they should remain identical for all pupils involved in a certain kind of instruction programs.

Concerning the contents, the main differentiation and individualization directions are the variation of the volume of knowledge and information depending on the potential of the pupils involved in the process of instruction and learning (by applying to the requirements specific to the proximal development law and therefore there is set an increased step up in forwarding in this field depending on how the pupil manages to solve the tasks set) and the way

and the method in which the knowledge is presented to pupils (by judicious use of didactic transposition, in order to help the knowledge signification process by pupils). As didactic efficient strategy one can use the semantic organization of knowledge, by cognitive diagrams, semantic networks of cognitive prototypes and scenarios.

Regarding the didactic method we should say that the methods, too, namely the instruction means need to be selected to be as much as possible adjusted to pupils' object of the instruction and learning activity. For example, the constant application to methods with a high formativity degree learning through discovery, problematization, case study, cluster method and so on, represent a benefic step for adjusting the instruction to the characteristics and peculiarities of the pupils involved in this kind of activity, so the benefit for each pupil in studying would be maximum.

Eventually, the differentiation by the method of organization of the process of instruction-learning can be done by using a range of types of the didactic activity organization as various as possible (level classrooms, level groups or activity organized independently).

Research: methodology and results

For the variable in discussion, the *methods of research* used were *the questionnaire-based inquiry* applied to a sample of 350 students from the 8th grade, from the South - Eastern part of Romania. (It's about the last year of secondary school in the Romanian Educational System, the age of the students being between 14-15 years old.)

In this study, we were interested in the *degree in which the pupils perceive the didactic act as being differentiated* (depending on everyone's peculiarities). Therefore, we've introduced the item:

In the development of the learning activities (work tasks, homework,...) the mathematics teacher solicited us differently, taking into account the ability of each of us.

The table below synthesize the indicators of the central tendency, respectively the spread indices, for this item.

Table 1. Statistic indices for "differentiated approach during mathematics classes"

N	Valid	350
	Missing	0
Median		4,0000
Mode		1,00
Std. Deviation		1,82581
Variance		3,334
Minimum/Maximum		1,00*/ 6,00**

Interpretation:
* *1- the statement doesn't fit for me at all*
** *6- the statement fits for me in a very high degree*

By analyzing the distribution of the frequencies for this item (Figure 1), there is shown that the highest frequency (24,6%, which represents almost a quarter of the subjects questioned) is registered by the answer *the statement does not fit for me at all* which means that those pupils don't feel that the didactic act is adjusted to their personal learning needs. Moreover, almost half of the respondents (46,3%), say that the demands by the mathematics teacher rather not comply with the differences between individual capacities.

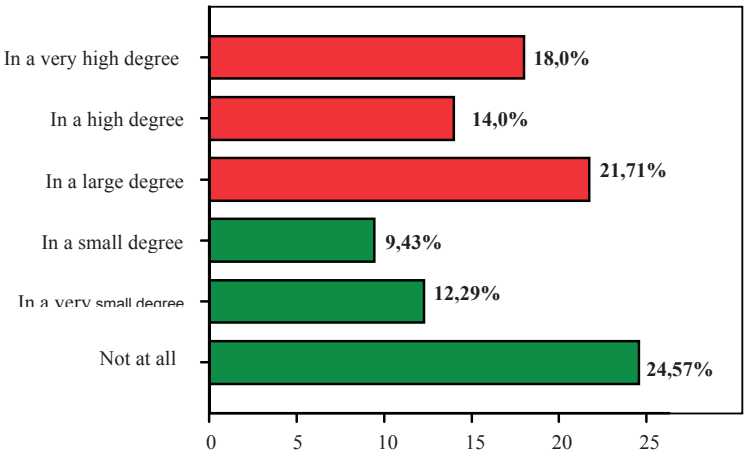
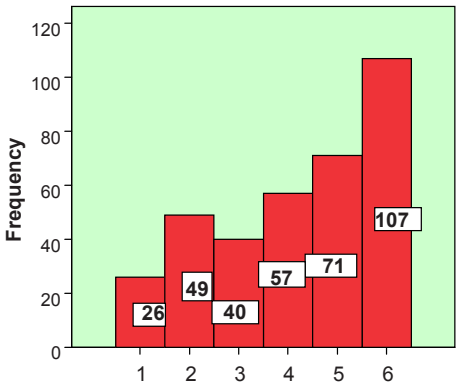


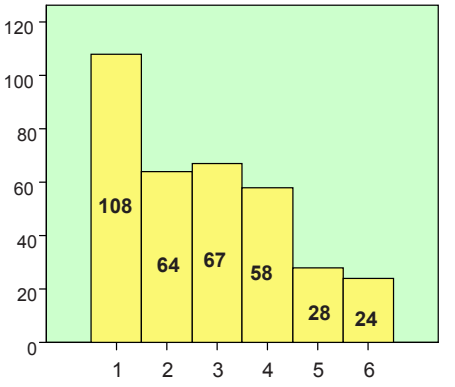
Figure 1. The distribution of frequencies for "the differentiated approach during mathematics classes"

The questionnaire included several sets of items constructed with the purpose of the research of *the forms of organizing* used in the mathematics class.



In class, the mathematics teacher asks us to work **individually, on the notebooks**

Figure 2. Histogram for „working individually, on the notebooks"

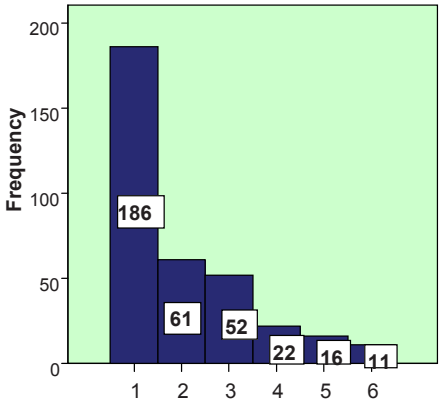


In class, the mathematics teacher asks us to work **individually, on the worksheets**

Figure 3. Histogram for „working individually, on the worksheets"

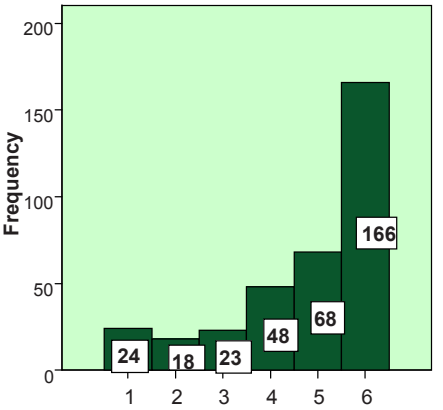
Interpretation:

1- the statement doesn't fit for me at all ... 6- the statement fits for me in a very high degree



In class, the mathematics teacher asks us to work
in teams

Figure 4. Histogram for
„working in teams"



In class, the mathematics teacher asks us to work
frontally, simultaneously with the student at the blackboard

Figure 5. Histogram for
„working frontally, simultaneously with the student at the blackboard"

Interpretation:

1- the statement doesn't fit for me at all ... 6- the statement fits for me in a very high degree

Conclusions

The differentiated approach of pupils, during mathematics classes, still remains in the phase of desiderate. We believe that this can't even be completely achieved, but the diversification of the didactic act is an instrument available to any mathematics teacher, in order to to meet the expectations and needs of a large number of learning profiles: variation of the presentation of messages (auditory and visual), the use of a range of methods and didactic means as various and appropriate as possible, the emphasis of individual activity of pupils, by using individual work sheets (which increase the degree of involvement in learning of the pupils), are only a few examples of strategies easily to apply. By removing these **obstacles**, the access of a large number of pupils to knowledge.

References

Mialaret, G. (1991). *Pédagogie generale.* Paris: P.U.F.
Minder, M. (2011). *Didactica funcţională: obiective, strategii, evaluare; cognitivismul operant.* Cluj-Napoca: Editura ASCR.
Perrenoud, Ph. (1998). *L`évaluation des élèves.* Paris-Bruxelles: De Boeck Université.
Raynal, F., Rieunier, A. (2005). *Pédagogie: dictionnaire des concepts clés. Apprentissages, formation, psychologie cognitive*, Paris: ESF éditeur.